

# Master Specification

## Part RD-EL-C4

### Installation of Safety Cameras at Traffic Signals and Mid-Block Sites

September 2024



**Government of South Australia**  
Department for Infrastructure  
and Transport

**Build.**  
**Move.**  
**Connect.**

## Document Information

Document Information	
K Net Number:	13507998
Document Version:	0
Document Date:	30/09/2024

## Document Amendment Record

Version	Change Description	Date
0	Initial issue	30/09/2024

## Document Management

This document is the property of the Department and contains information that is confidential to the Department. It must not be copied or reproduced in any way without the written consent of the Department. This is a controlled document and it will be updated and reissued as approved changes are made.

## Contents

Contents	3
RD-EL-C4 Installation of Safety Cameras at Traffic Signals and Mid-Block Sites	4
1 General	4
2 Documentation	6
3 Electrical installation	7
4 Construction of footings	7
5 Trench work, conduits and pits	8
6 Cabling	8
7 Installation of equipment	11
8 Detector loop installation	13
9 Warranty	16
10 Commissioning	16
11 Hold Points and Witness Points	17
12 Verification requirements and records	17
13 Appendix 1: Detector Pit - Safety Camera Loop Detector Analysis	18
14 Appendix 2: Camera Housing - Safety Camera Loop Detector Analysis	19
15 Appendix 3: Test Enclosure	20
16 Appendix 4: Detectors	23
17 Appendix 5: Safety Camera Loop Certification	24

---

# RD-EL-C4 Installation of Safety Cameras at Traffic Signals and Mid-Block Sites

## 1 General

- a) This Master Specification Part sets out the requirements for the installation of red light and speed detection safety cameras at signalised intersections and mid-block sites, including:
  - i) the documentation requirements, as set out in section 2;
  - ii) the requirements for electrical installation, as set out in section 3;
  - iii) the requirements for the construction of footings, as set out in section 4;
  - iv) the requirements for trench work, conduits and pits, as set out in section 5;
  - v) the cabling requirements, as set out in section 6;
  - vi) the requirements for the installation of equipment, as set out in section 7;
  - vii) the requirements for the installation of detector loops, as set out in section 8;
  - viii) the warranty requirements, as set out in section 9;
  - ix) the commissioning requirements, as set out in section 10;
  - x) the Hold Point and Witness Point requirements, as set out in section 11; and
  - xi) the verification requirements and records, as set out in section 12.
- b) Unless specified otherwise, this Master Specification Part does not apply to the installation of safety cameras for “point to point” and tunnel installations.
- c) The installation of red light and speed detection safety cameras at signalised intersections and mid-block sites must comply with the Reference Documents, including:
  - i) AS/NZS 2276 Cables for traffic signal installations;
  - ii) AS 2339 Traffic signal posts, mast arms and attachments;
  - iii) AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules);
  - iv) AS/NZS 3008.1.1 Electrical installations - Selection of cables, Part 1.1: Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions;
  - v) AS/NZS 5000 Electric cables - Polymeric insulated;
  - vi) Department Asset Data Collection Standard (AM-PRC-005);

Department Standard Drawings, including those listed in

- vii) Table RD-EL-C4 1-1 (available from: [https://dit.sa.gov.au/standards/standards\\_and\\_guidelines](https://dit.sa.gov.au/standards/standards_and_guidelines)); and
  - viii) SAPN Service & Installation Rules Manual No. 32.
- d) For the purposes of this Master Specification Part, “Detector Feeder Cables” means cables complying with AS/NZS 2276.2 Cables for traffic signal installations, Part 2: Feeder cable for vehicle detectors.

**Table RD-EL-C4 1-1 Department Standard Drawings**

Drawing No.	Sheet No.	Title
S-4055	66	Plastic Pits - Non Secured Concrete Lids & Surrounds
S-4055	67	Plastic Pits & Secure Steel Lids - Class A & Surrounds
S-4055	68	Plastic Pits & Secure Steel Lids - Class A & B Surrounds
S-4055	69	Plastic Pits & Lockable Steel Lids - Class A & B Surrounds
S-4055	70	Secure & Lockable Steel Lid Components
S-4500	1	Detector Loop Layout (1 of 2)
S-4500	2	Detector Loop Layout (2 of 2)
S-4500	3	Safety Camera - Infrastructure Detail Layout
S-4500	4	SCATS Loop Detector Layout - Infrastructure Layout Detail
S-4500	5	Safety Camera - Wiring Schematic
S-4515	2	Standard Drawing - Traffic Signal Post - Post Footing and Installation
S-4537	6	Traffic Signals Post - Post Types and Post Mounting Details
S-4537	4	Safety Camera Mounting Post - Traffic Signals
S-4537	5	Safety Camera - Footing & Pole Details

## 2 Documentation

### 2.1 Design Documentation

In addition to the requirements of PC-EDM1 “Design Management”, the Design Documentation must include:

- a) the safety camera wiring schematic and the duct layout design required by section 6.1b); and
- b) the electrical distribution dimensioning calculations and details of the proposed cable sizing required by section 6.3.1a).

### 2.2 Construction Documentation

In addition to the requirements of PC-CN3 “Construction Management”, the Construction Documentation must include:

- a) evidence of licensing, as required by section 3c);
- b) evidence of compliance with section 3d), as required by section 3d)iii);
- c) alternative supplier requirements for installation of camera post and flash post footings (where relevant), as required by section 4c)i);
- d) at sites where the electrical supply is not taken from a traffic signal controller, location details of consumer mains service cable between the SAPN connection point and an isolation pit, as required by section 6.2a);
- e) alternative supplier requirements for installation of flash pole or flash units (where relevant), as required by section 7.2b)i);
- f) alternative detector loop cable manufacturer installation requirements (where relevant), as required by section 8.3b)i); and
- g) alternative safety camera loop cable manufacturer installation requirements (where relevant), as required by section 8.5.1a)ii)A.

### 2.3 Quality Management Records

In addition to the requirements of PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable), the Quality Management Records must include:

- a) the electrical distribution dimensioning calculations recorded on electrical certificates of compliance as required by section 6.3.1b):



- b) the surveyor camera loop survey certificate required by section 8.5.5b);
- c) the verification records required by Table RD-EL-C4 12-1;
- d) the detector pit - safety camera loop detector analysis required by required by section 8.5.2c);  
and
- e) the camera housing - safety camera loop detector analysis required by section 8.5.3d).

### 3 Electrical installation

- a) The Contractor must ensure that all electrical installations for safety cameras:
  - i) are carried out by an electrical worker who is licensed to perform electrical works; and
  - ii) comply with:
    - A. AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules); and
    - B. SAPN Service & Installation Rules Manual No. 32.
- b) The Contractor must ensure that all connections to any communications network in relation to the safety cameras:
  - i) are carried out by a provider who is licensed by the Australian Communications and Media Authority (ACMA) to perform such works; and
  - ii) comply with all ACMA license requirements.
- c) The Contractor must provide evidence of the licenses required in sections 3a) and 3b) to the Principal as part of the Construction Documentation, prior to commencement of any electrical works by the Contractor.
- d) The Contractor must ensure that for powered equipment which is fed from the non-metered traffic signal power supply:
  - i) the brand and model number or version of all powered equipment installed must be included in the AEMO National Electricity Market Load Table;
  - ii) the equipment must comply with all AEMO requirements, including approved load tables for unmetered connection points; and
  - iii) evidence of compliance with this section 3d) is submitted as part of the Construction Documentation.

### 4 Construction of footings

- a) The requirements of this section 4 apply to the construction of footings for the installation of safety cameras.
- b) The Contractor must ensure that:
  - i) cast-in-place concrete complies with ST-SC-S1 "Normal Class Concrete";
  - ii) the top surface of concrete is finished with a wooden float to a smooth even surface;  
and
  - iii) subject to section 4c):
    - A. all camera post footings are constructed in accordance with Department Standard Drawing S-4537, sheet 5; and
    - B. all flash post footings are constructed in accordance with Department Standard Drawing S-4515, sheet 2.

- c) Where the supplier of the safety camera has installation requirements which are incompatible with those specified in section 4b)iii), the Contractor must:
  - i) submit the supplier requirements and footing designs to the Principal as part of the Construction Documentation; and
  - ii) ensure that the camera post and flash post footings are constructed in accordance with the Construction Documentation

## 5 Trench work, conduits and pits

- a) The Contractor must ensure that all boring for conduits, trench work, conduits, and pits required for the installation of safety cameras comply with the following:
  - i) RD-EW-C3 “Boring”;
  - ii) RD-EW-C2 “Trench Excavation and Backfill”;
  - iii) RD-PV-C6 “Reinstatement of Existing Pavements”;
  - iv) RD-EL-D3 “Conduit Design for Road Lighting, Traffic Signals and ITS”;
  - v) RD-EL-C3 “Supply and Installation of Conduits and Pits”.
- b) The Contractor must ensure that all pits and conduits installed for safety cameras:
  - i) conform to Department Standard Drawing S-4500, sheet 3; and
  - ii) are lockable and suitably marked with “ELECTRICAL”, “COMMUNICATION” or “DETECTOR”.

## 6 Cabling

### 6.1 General

- a) The requirements of this section 6 apply to cabling installed for safety cameras.
- b) The Design Documentation must include:
  - i) a safety camera wiring diagram (wiring schematic) provided in accordance with Department Standard Drawing S-4500, sheet 5; and
  - ii) a duct layout design in accordance with the requirements of RD-EL-D2 “Traffic Signal Design”.
- c) The Contractor must ensure that:
  - i) the installation of conduit and cables is:
    - A. as shown in the safety camera wiring diagrams, cable connection schedules and in conjunction with the duct layout drawing; and
    - B. in accordance with the requirements of RD-EL-C2 “Installation of Traffic Signals”;
  - ii) all cables are continuous and without joins except at termination points;
  - iii) all installed cables that run through a cable pit have at least 1 m of spare cable in a loop in each cable pit;
  - iv) all ELV cables terminated under a screw terminal are fitted with bootlace crimps or appropriate crimp lug;
  - v) cables are drawn through ducts using draw cords;
  - vi) cables are installed through pits and conduits without causing damage to the cable, conduits or pits;



- vii) strain exceeding cable manufacturer's recommendations is not placed on any individual core, individual cable or group of cables during the drawing in process; and
  - viii) a draw cord remains in the duct after the installation of the cable to enable the installation of additional cables in the future as required by RD-EL-C3 "Supply and Installation of Conduits and Pits".
- d) Where a cable pit adjacent to the traffic signal controller has been nominated in the Contract Documents, the Contractor must provide lengths of LV and ELV cables to finalise the electrical installation for safety cameras. These cables must:
- i) be sealed at the ends to prevent moisture ingress; and
  - ii) be of a length that allows for:
    - A. 1 m of spare in the pit;
    - B. the conduit run to the traffic signal controller; and
    - C. 2 m for termination in the traffic signal controller.

## 6.2 Consumer mains service cable (LV cable)

The Contractor must ensure that:

- a) at sites where the electrical supply is not taken from a traffic signal controller, a consumer mains service cable is installed as shown on the Construction Documentation and in accordance with the SAPN Service & Installation Rules Manual No. 32 in between:
  - i) the SAPN connection point; and
  - ii) an isolation pit as described in RD-EL-C2 "Installation of Traffic Signals" as shown on the duct layout drawing;
- b) where the SAPN connection point cannot be located close to the underground service pit and the consumer mains service cable is drawn to the underground service pit via underground cable draw in pits, the consumer mains cable must be:
  - i) drawn in through a separate duct to all other cables unless otherwise specified on the duct layout drawing;
  - ii) fixed with insulated saddles to the walls of such underground draw in pits; and
  - iii) clearly labelled as "CONSUMER MAINS SERVICE" in each underground cable draw in pit; and
- c) the following minimum lengths of spare consumer mains service cable are provided for installation between the underground service pit and the SAPN connection point:
  - i) 1.5 m at the SAPN connection point;
  - ii) 1.5 m at each cable draw in pit (if installed); and
  - iii) 1.5 m at the Department isolation pit.

## 6.3 Supply cable

### 6.3.1 General

- a) The Design Documentation must include:
  - i) calculations showing electrical distribution dimensioning from the SAPN connection point (including voltage drop and impedance loop calculations); and
  - ii) details of the proposed cable sizes forming part of the electrical design associated with the LV mains power supplies for safety camera equipment.

- b) The electrical distribution dimensioning calculations must also be recorded on electrical certificates of compliance as required by:
  - i) AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules); and
  - ii) applicable Laws, including the *Electricity Act 1996 (SA)* and the *Electricity (General) Regulations 2012 (SA)*,  
which must be submitted as part of the Quality Management Records.
- c) The Contractor must ensure that the minimum supply cable size is 4 mm<sup>2</sup> circular active and neutral, with 2.5 mm<sup>2</sup> earth.
- d) The Contractor must ensure that:
  - i) the supply cable terminates into an RCD socket outlet in the test enclosure (see Appendix 3: Test Enclosure for example); and
  - ii) the main LV cable connections:
    - A. are looped at the line terminals of the RCD socket outlet;
    - B. continue into the camera housing; and
    - C. terminate at the mains junction box.

### 6.3.2 Consumer mains service cable

The Contractor must ensure that where the electrical supply is from a dedicated SAPN connection point, it is protected by a 10 A Type “C” curve circuit breaker.

### 6.3.3 Traffic signal controller service cable

- a) Where a safety camera is being installed at an existing traffic signal site, the Principal will provide a dedicated 10Amp ‘C’ curve circuit breaker inside the traffic signal controller exclusively for the supply to the safety camera.
- b) The Contractor must ensure that where the mains supply for the safety camera is derived from a traffic signal controller that the safety camera mains supply runs from the pit adjacent to the traffic signal controller to the RCD socket outlet in the test enclosure (refer Appendix 3: Test Enclosure for example).
- c) Upon completion of the Works, the Principal will install the LV and ELV electrical wiring from the safety camera cable pit to the traffic signal controller.

## 6.4 Camera flash supply and control cables

- a) The Contractor must install the flash supply and control cables from the camera enclosure to the upper mounting terminals on the flash pole.
- b) The Contractor must:
  - i) connect the cables;
  - ii) terminate the harnesses in the flash pole upper mounting assembly (ensuring LV and ELV segregated terminals); and
  - iii) install the duct cover, protective sleeve and final cap on the upper mounting assembly.

## 6.5 Communication cable

### 6.5.1 General

The Contractor must provide all required communications cabling in accordance with safety camera manufacturer’s specifications.

### 6.5.2 Signal phase interface cable

The Contractor must ensure that for safety cameras at traffic signal sites:

- a) the signal phase interface cable from the safety camera is installed from the camera housing to the traffic signal controller pit; and
- b) either:
  - i) ensure that the signal phase interface cable is connected to the signal phase terminations inside the controller, where the Contract Documents include a requirement for the Contractor to terminate the signal phase interface cable at the signal controller; or
  - ii) where the Contract Documents do not include a requirement for the Contractor to terminate the signal phase interface cable at the signal controller, ensure that sufficient spare cable is left in the traffic signal controller pit to allow connection inside the traffic signal controller at the signal interface termination point.

## 7 Installation of equipment

### 7.1 Camera pole and housing

The Contractor must ensure that the camera, housing and poles are installed in accordance with the supplier's specifications, including that:

- a) all camera poles are installed so that the test enclosure is orientated with the door facing away from the intersection;
- b) the holding down bolts in the base foundation are treated with a rust inhibiting lubricant prior to erection of the camera pole;
- c) the base plate is firmly bolted down to the concrete foundation;
- d) the camera pole is tightened down to the base plate ensuring the galvanized outer surface of the pole is not damaged;
- e) all cables and the communications conduit are laid inside the camera pole; and
- f) any concrete tops (pole base surrounds) are installed to footpath level.

### 7.2 Flash pole and flash unit

- a) For camera flash pole and flash unit installation, the Contractor must:
  - i) ensure that the flash pole is constructed in accordance with Department Standard Drawing S-4537, sheet 6 "Traffic Signal Posts Post Types and Post Mounting Details", option "Type 1 Standard Post";
  - ii) lay all cables inside the safety camera flash pole;
  - iii) allow approximately 1 m for cables to be stored, in a coil, in the camera flash pole base and for termination in the upper mounting assembly;
  - iv) treat the holding down bolts, the threaded end of the pole and the threaded base plate with a rust inhibiting lubricant prior to erection of the pole. The base plate must be firmly bolted down to the concrete foundation;
  - v) stand and secure camera flash pole with nuts and washers ensuring that the pole is plumb, using non-corrosive metal packing shims;
  - vi) install and generally align towards the traffic signal intersection the camera flash unit arm with bandit strap. The arm must be installed pointing away from the kerb to prevent tall vehicles damaging the flash unit;
  - vii) install the camera flash unit and, if applicable, align to the middle lanes stop bar;

- viii) at the base of the camera flash pole, seal off cavities with black plastic and backfill with washed sand; and
- ix) install the concrete tops to footpath level.
- b) Where the supplier of the safety camera has installation requirements for the flash pole or flash unit which are incompatible with those specified in section 7.2a), the Contractor must:
  - i) submit the supplier requirements, pole and footing designs to the Principal as part of the Construction Documentation; and
  - ii) ensure that the flash pole and flash unit are constructed in accordance with the Construction Documentation.

## 7.3 Test enclosure

### 7.3.1 General

- a) The Contractor must supply and install a test enclosure which at a minimum provides the following (refer Appendix 3: Test Enclosure for example):
  - i) IP 65 protection;
  - ii) marine grade aluminium 5251 H32 with polyester powder coating or marine grade stainless steel construction;
  - iii) lockable with a key, with the lock key coded in accordance with the Contract Documents;
  - iv) mounted on the camera pole with a minimum of overlap to the dimensions of the pole;
  - v) dual RCD protected socket outlets;
  - vi) RJ45 socket which is connected to the safety camera router; and
  - vii) door alarm switch which:
    - A. is wired in accordance with Department Standard Drawing S-4500, sheet 5; and
    - B. complies with the requirements of section 7.3.2.
- b) The Contractor must install the test enclosure on the camera pole in a manner which:
  - i) preserves the ingress protection rating of the enclosure and pole;
  - ii) protects the cables entering the enclosure from any sharp edges; and
  - iii) secures the enclosure to the pole via a minimum of four threaded connectors (for example, bolts or set screws, washers and nuts) which have a thread locking and anti-seize treatment applied immediately prior to installation.

### 7.3.2 Test enclosure door alarm switch

The Contractor must ensure that the test enclosure door alarm switches satisfy the following requirements:

- a) the alarm switch must be:
  - i) mounted onto a RJ45 switch plate using 4 6BA x 6.4 mm countersunk set screws; and
  - ii) adjusted such that the switch contacts close when the door is opened more than 10 degrees from its closed position; and
- b) wiring for the door alarm switch must either satisfy the safety camera manufacturer specifications or otherwise satisfy the following:
  - i) the door alarm cable must be terminated at the n/o contacts of the alarm switch using the blue / white-blue wires;

- ii) the connection in the test enclosure must be terminated by disconnecting the grey wire from terminal 17 on the camera housing terminal block plate and connecting with a splice connector (3M Scotchlok UY2-2 Position or equivalent) to the test enclosure cable using the white-blue core; and
- iii) the blue core must be connected to terminal 17 on the camera housing terminal block.

## 8 Detector loop installation

### 8.1 General

The Contractor must ensure that safety camera detector loops are installed in accordance with:

- a) the Contract Documents;
- b) safety camera detector loop manufacturer specifications; and
- c) Department Standard Drawing S-4500 sheet 3.

### 8.2 Reinstatement of existing asphalt.

- a) If the Contract Documents specify that any existing asphalt is to be reinstated following installation of the safety camera detector loops, the Contractor must:
  - i) plane out the existing asphalt to the extent described in the Contract Documents to a depth of 80 mm; and
  - ii) reinstate in two equal layers of AC10M A5E (i.e. 2 x 40 mm AC10M A5E) constructed in accordance with RD-BP-C3 "Construction of Asphalt Pavement", noting that if a current "mix registration certificate" for the asphalt is provided in accordance with RD-BP-S2 "Supply of Asphalt" then no coring for testing is required.
- b) Completion of the asphalt reinstatement set out in section 8.2a) constitutes a **Witness Point**.

### 8.3 Detector loop cables

In relation to detector loop cables installed for safety cameras, the Contractor must ensure that the detector loops are provided and installed in accordance with the requirements of either:

- a) RD-EL-C2 "Installation of Traffic Signals"; or
- b) the safety camera manufacturer, subject to:
  - i) the Contractor submitting such installation requirements to the Principal as part of the Construction Documentation; and
  - ii) the Principal providing its approval to such alternate installation as part of the Construction Documentation review process.

### 8.4 Detector feeder cables

In relation to detector feeder cables installed for safety cameras, the Contractor must ensure that:

- a) detector feeder cables are drawn in separate conduits to LV and LV/ELV cables (unless otherwise specified on the duct layout drawing);
- b) 500 mm of detector feeder cable tails is provided at the detector pit; and
- c) all detector loops are identified in the detector pit by means of labelling on each feeder cable in accordance with RD-ITS-C1 "Installation and Integration of ITS Equipment".

## 8.5 Safety camera loop detectors

### 8.5.1 General

- a) In relation to detector loops installed for safety cameras, the Contractor must ensure that the detector loops are provided and installed in accordance with the requirements of either:
  - i) RD-EL-C2 "Installation of Traffic Signals"; or
  - ii) the safety camera manufacture subject to:
    - A. the Contractor submitting such installation requirements to the Principal as part of the Construction Documentation; and
    - B. the Principal providing its approval to such alternate installation as part of the Construction Documentation review process; and
- b) the Contractor must ensure that:
  - i) safety camera loop detectors are installed:
    - A. within the tolerances set by the safety camera manufacturer;
    - B. as specified in the site-specific approved traffic signal drawings; and
    - C. as shown on Department Standard Drawing S-4500, sheet 3;
  - ii) for the treatment of loop cuts at the intersections of the cuts at corners, it is permitted to drill loop cut corners with a 32 mm drill to remove sharp edges at the cut; and
  - iii) each loop detector lead in cable pair, from the camera loop detector to the final connection in the camera loop detector pit, maintains a twist of a minimum of 5 twists per 300 mm.

### 8.5.2 Loop detector electrical measurements

- a) The Contractor must measure and record the following for each loop detector at the safety camera loop detector pit:
  - i) loop inductance;
  - ii) loop resistance;
  - iii) Q factor;
  - iv) loop frequency; and
  - v) insulation resistance to earth.
- b) The Contractor must ensure that each safety camera loop detector measurement satisfies the typical loop detector values as specified by the safety camera supplier.
- c) The Contractor must record all results of the safety camera loop detector measurements required by this section 8.5.2 on the form: "DETECTOR PIT - SAFETY CAMERA LOOP DETECTOR ANALYSIS" (see Appendix 1: Detector Pit - Safety Camera Loop Detector Analysis).

### 8.5.3 Loop detector feeder cables and electrical measurements

- a) The Contractor must ensure that:
  - i) sufficient feeder cable is provided for termination at both the camera housing and at the camera loop detector pits, including a spare length of 500 mm of cable which must be located in the safety camera detector loop pit;
  - ii) loop detector feeder cables are continuous, i.e. with no joints in between the detector cable and safety camera termination points; and

- iii) the camera loop detector feeder cables are terminated in the camera housing terminal block in accordance with the safety camera manufacturer's requirements.
- b) Prior to terminating the camera loop detector feeder cables in the camera housing, the Contractor must measure each camera loop detector feeder cable at the camera housing for:
  - i) loop inductance;
  - ii) loop resistance;
  - iii) Q factor;
  - iv) loop frequency; and
  - v) insulation resistance to earth.
- c) The Contractor must ensure that each safety camera loop detector feeder cable measurement satisfies the typical loop detector value ranges as specified by the safety camera supplier.
- d) The Contractor must record all results of the camera loop detector feeder cables on the form: "CAMERA HOUSING - SAFETY CAMERA LOOP DETECTOR ANALYSIS" (see Appendix 2: Camera Housing - Safety Camera Loop Detector Analysis) and provide as a part of the Quality Management Records.
- e) The submission of the "Camera Housing - Safety Camera Loop Detector Analysis" records to the Principal indicating that each loop detector and feeder cable satisfies the required measurement ranges constitutes a **Hold Point**. The Site Acceptance Testing (SAT) required by section 10.2 will not be considered to be complete until this Hold Point has been released.

#### 8.5.4 Cable connections

The Contractor must ensure that:

- a) the loop detectors are connected to the loop detector feeder cables in the loop detector pit;
- b) each loop detector feeder cable has heat shrink tubing with thermoplastic adhesive applied to the end where the cable that exposes the internal cores is cut. The feeder cable must have the screen cut off at this point as the screen will be earthed at the camera enclosure only. The heat shrink must extend a minimum of 20 mm past the cut and encapsulate the cores and a minimum of 50 mm over the cable;
- c) the loop detector cable is connected to the loop detector feeder cable by stripping each cable and twisting the bared cables together and soldering the ends. The final soldered connection must be a minimum of 10 mm in length;
- d) the soldered connections are either:
  - i) secured inside a loop detector pot and the pot filled with 3M Scotchcast resin or equivalent (refer to Appendix 4: Detectors for detail); or
  - ii) sealed using thermoplastic adhesive lined heat shrink tubing that extends a minimum of 20 mm past the stripped and soldered cable;
- e) to facilitate maintenance, all loop detector to loop detector feeder cable terminations are capable of being withdrawn a minimum of 500 mm outside of the loop detector pit (refer to Appendix 4: Detectors for detail); and
- f) heat shrink tubing used for any connections is:
  - i) semi-rigid;
  - ii) adhesive lined;
  - iii) abrasion resistant;
  - iv) waterproof; and
  - v) UV resistant.



### 8.5.5 Survey

- a) The Contractor must survey the installed camera loop detectors using a current Departmental prequalified surveyor. A list of prequalified members is available at [https://www.dit.sa.gov.au/contractor\\_documents/prequalification](https://www.dit.sa.gov.au/contractor_documents/prequalification).
- b) Provision of the surveyor's camera loop survey certificate to the Principal (see Appendix 5: Safety Camera Loop Certification) must be included as a part of the Quality Management Records.

## 9 Warranty

The Contractor must ensure that warranty provisions for the installation of safety cameras comply with the requirements of:

- a) the Contract Documents; and
- b) RD-ITS-S1 "General Requirements for the Supply of ITS Equipment".

## 10 Commissioning

### 10.1 General

- a) All testing and commissioning procedures and documentation must comply with the requirements of:
  - i) PC-CN1 "Testing and Commissioning"; and
  - ii) PC-CN2 "Asset Handover".
- b) Prior to the commissioning of any safety camera, the Contractor must:
  - i) audit the Site against drawings and provide records in accordance with:
    - A. the requirements of the Department Asset Data Collection Standard (AM-PRC-005); and
    - B. the format specified in the RITS Data Collection Template;
  - ii) allow in the Contract Program at least 2 days testing with the Principal;
  - iii) liaise with the Principal to arrange a suitable date for commissioning following completion of electrical and functional testing; and
  - iv) provide the electrical certificates of compliance required by AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) and applicable Laws (including the *Electricity Act 1996* (SA) and the *Electricity (General) Regulations 2012* (SA)).
- c) The Contractor must attend the commissioning to complete the Works. After the camera has been commissioned, the Contractor must remove all temporary traffic control devices and associated equipment from Site.

### 10.2 Site acceptance test

- a) As a component of commissioning, the Contractor must undertake Site Acceptance Testing (SAT) of all safety camera equipment in accordance with the relevant SAT Plan.
- b) The SAT Plan relating to safety camera Site Acceptance Testing must comply with the following tests:
  - i) each camera post and the attached equipment must:
    - A. operate correctly;

- B. be installed in accordance with this Master Specification Part; and
  - C. be properly aimed at the appropriate traffic; and
- ii) the installation must not allow any unsafe situation.

## 11 Hold Points and Witness Points

- a) Table RD-EL-C4 11-1 details the review period or notification period, and type (documentation or construction quality) for each Hold Point referred to in this Master Specification Part.
- b) Table RD-EL-C4 11-2 details the review period or notification period, and type (documentation or construction quality) for each Witness Point referred to in this Master Specification Part.

**Table RD-EL-C4 11-1 Hold Points**

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
8.5.3e)	Submission of "Camera Housing - Safety Camera Loop Detector Analysis" records	Documentation	24 hours review

**Table RD-EL-C4 11-2 Witness Points**

Section reference	Witness Point	Documentation or construction quality	Review period or notification period
8.2b)	Completion of asphalt reinstatement	Construction quality	48 hours notification

## 12 Verification requirements and records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-EL-C4 12-1 have been complied with.

**Table RD-EL-C4 12-1 Verification records**

Section reference	Subject	Record to be provided
8.2a)ii)	Asphalt reinstatement	Mix registration certificate for any replacement asphalt
10.1b)iv)	Commissioning	Electrical certificates of compliance required by AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) and applicable Laws (including the <i>Electricity Act 1996 (SA)</i> and the <i>Electricity (General) Regulations 2012 (SA)</i> )

### 13 Appendix 1: Detector Pit - Safety Camera Loop Detector Analysis

Site Details					
Camera Type					
Location Address					
Approach Monitored					
Lanes Monitored	1	2	3	4	5

Loop Detector Details						
Lane	1	2	3	4	5	Unit
*Loop Inductance 1st Loop						μH
*Loop Inductance 2nd Loop						μH
Loop Resistance 1st Loop						Ω
Loop Resistance 2nd Loop						Ω
“Q” Factor 1st Loop						-
“Q” Factor 2nd Loop						-
Loop Frequency 1st Loop						kHz
Loop Frequency 2nd Loop						kHz
Insulation Resistance 1st Loop						MΩ
Insulation Resistance 2nd Loop						MΩ

Date
Contractor’s Name (Print)
Contractor’s Signature

## 14 Appendix 2: Camera Housing - Safety Camera Loop Detector Analysis

Site Details					
Camera Type					
Location Address					
Approach Monitored					
Lanes Monitored	1	2	3	4	5

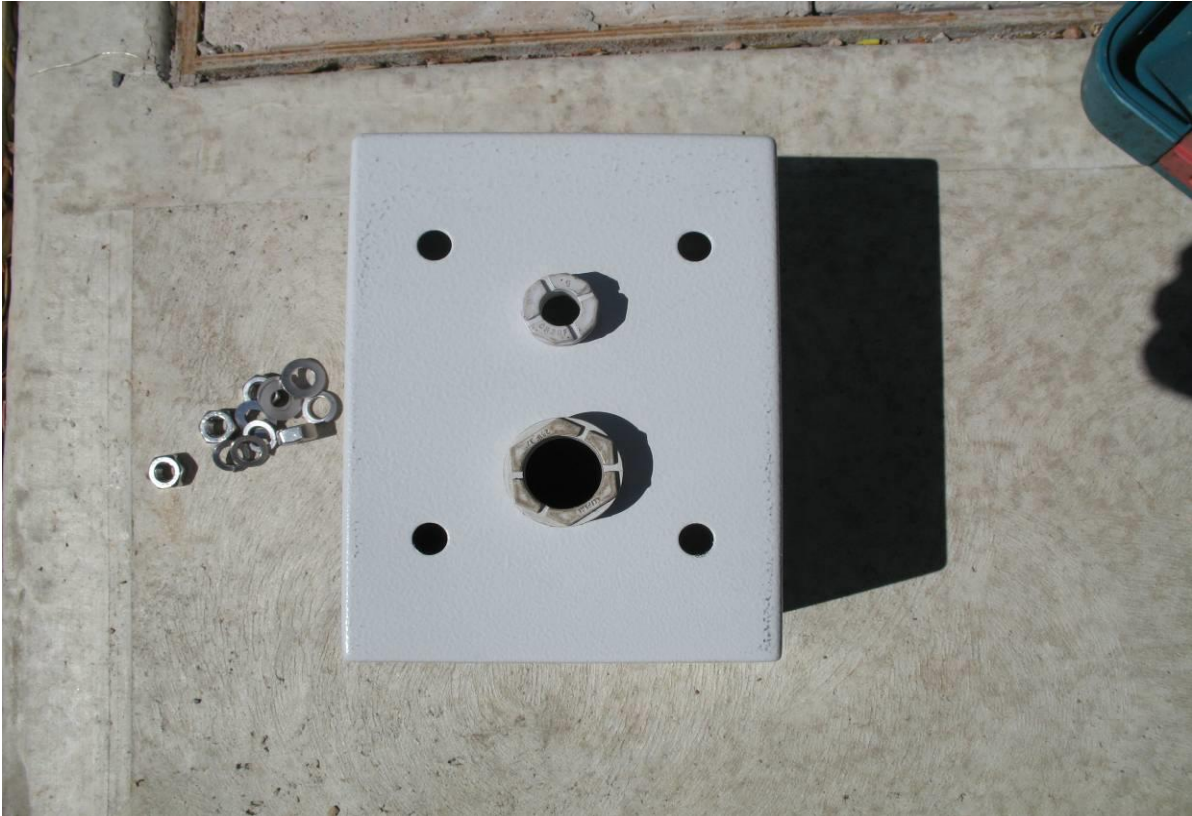
Loop Detector Details						
Lane	1	2	3	4	5	Unit
*Loop Inductance 1st Loop						μH
*Loop Inductance 2nd Loop						μH
Loop Resistance 1st Loop						Ω
Loop Resistance 2nd Loop						Ω
“Q” Factor 1st Loop						-
“Q” Factor 2nd Loop						-
Loop Frequency 1st Loop						kHz
Loop Frequency 2nd Loop						kHz
Insulation Resistance 1st Loop						MΩ
Insulation Resistance 2nd Loop						MΩ

Date
Contractor’s Name (Print)
Contractor’s Signature

# 15 Appendix 3: Test Enclosure











# 16 Appendix 4: Detectors



## 17 Appendix 5: Safety Camera Loop Certification

SCLC # 00 \_\_\_\_\_

SAPOL SITE # \_\_\_\_\_

### SITE DETAILS

DIT TS # \_\_\_\_\_ LANE \_\_\_\_\_ OF \_\_\_\_\_ LANES SURVEYED

ROAD \_\_\_\_\_ (CAMERA \_\_\_\_\_ INSTALLED \_\_\_\_\_ ON)

INTERSECTING \_\_\_\_\_ ROAD(S) \_\_\_\_\_

LOCATION \_\_\_\_\_

DIRECTION \_\_\_\_\_ OF \_\_\_\_\_ TRAVEL \_\_\_\_\_

(NOTE: Lane reference is based on lanes with induction loops only and not necessarily the physical traffic lane, as not all lanes are installed with induction loops)

### MEASUREMENTS

DATE (LOOP SURVEY CONDUCTED)# \_\_\_\_\_ MAKE \_\_\_\_\_ OF \_\_\_\_\_ MEASURING  
 DEVICE \_\_\_\_\_

MEASUREMENTS UNDERTAKEN BY \_\_\_\_\_ SERIAL # \_\_\_\_\_ OF \_\_\_\_\_ MEASURING  
 DEVICE \_\_\_\_\_

QUALIFICATION \_\_\_\_\_ CERTIFICATION # OF MEASURING DEVICE \_\_\_\_\_

CERTIFIED

SIGNATURE\* \_\_\_\_\_  
\_\_\_\_\_

FULL

NAME

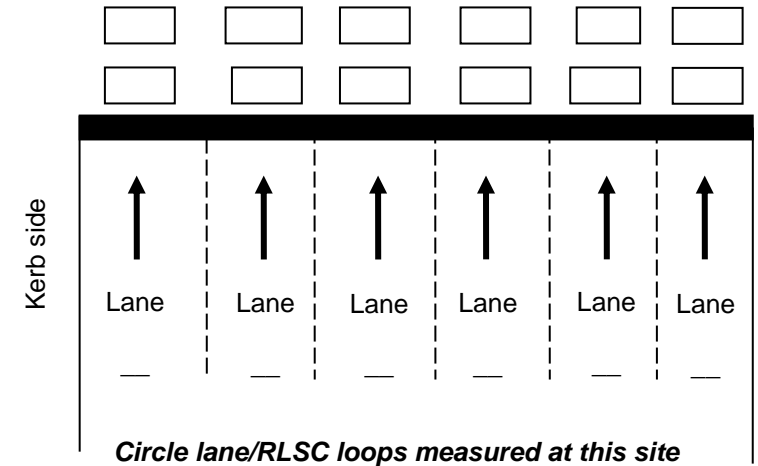
(PRINT)

COMPANY

NAME  
\_\_\_\_\_

SURVEYED MEASUREMENTS Red Light / Speed Camera (RLSC) Loops

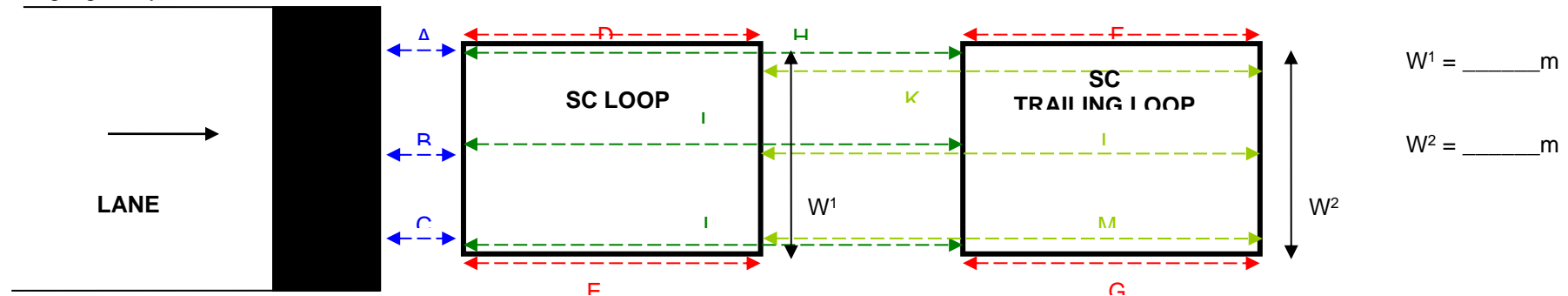
Length	Inset from Edge of Loop	Measured Distance (m)	Standard Distance (m)	Variance +/- (m)*	Tolerance Limit ( $\pm 1\%$ )^ (m)
A	0.2 m		N/A	N/A	N/A
B	0.5 W1		N/A	N/A	N/A
C	0.2 m		N/A <td N/A	N/A	
D	0.2 m		1.0		$\pm 0.010$
E	0.2 m		1.0		$\pm 0.010$
F	0.2 m		1.0		$\pm 0.010$
G	0.2 m		1.0		$\pm 0.010$
H	0.2 m		2.5		$\pm 0.025$
I	0.5 W1		2.5		$\pm 0.025$
J	0.2 m		2.5		$\pm 0.025$
K	0.2 m		2.5		$\pm 0.025$
L	0.5 W2		2.5		$\pm 0.025$
M	0.2 m		2.5		$\pm 0.025$



Notes:

^ Tolerance is  $\pm 1\%$  of standard measurements

\* Highlight any out of tolerance measurements



SIGNATURE \* \_\_\_\_\_

DATE CONDUCTED \* \_\_\_\_\_

